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(54) PRODUCTION OF COLOR FILTER

(57)Abstract:

PROBLEM TO BE SOLVED: To produce a color filter having high density by spraying a specified ink compsn. by an ink-jet method on a transparent substrate having a specified polymer crosslinked layer, then drying and treating the sprayed material with water.

SOLUTION: An ink compsn. prepared by dissolving an anion dye in an amide solvent soln. is sprayed by an ink-jet method on a transparent substrate having a polymer crosslinked layer which can be dyed with anion dyes. The sprayed material is dried and treated with water. As for the amide solvent, a compd. having no active hydrogen is preferable considering the dyeing property, and especially N-methylpyrrolidone is preferable. The amt. of the amide solvent in the ink compsn. is preferably 3 to 40wt%. The density of the anion dye in the ink compsn. is preferably 1 to 10%. The polymer which can be dyed with anion dyes is preferably a resin having tertiary amino groups.

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CLAIMS

[Claim(s)]

[Claim 1] The manufacture approach of the light filter which injects the ink constituent made to dissolve an anionic color in the water solution of an amide series solvent by the ink jet method on the transparency substrate which has the bridge formation body whorl of an anionic color tingibility polymer, and is characterized by carrying out water treatment after drying.

[Claim 2] The manufacture approach of the light filter of claim 1 that an amide series solvent is the compound which does not have active hydrogen.

[Claim 3] the compound which does not have active hydrogen — N-methyl pyrrolidone, N,N-dimethylacetamide, N, and N-JIMERU formamide, N, and N-diethyl formamide, N, and N-dimethyl propione amide, N-methyl-epsilon caprolactam, 1,3-dimethyl-2-imidazolidinone or N and N, N', and N — ' — the manufacture approach of the light filter of claim 2 which is — tetramethylurea.

[Claim 4] The manufacture approach of the light filter of claim 1 whose concentration of the water solution of an amide series solvent is 3 – 40% thru/or any 1 term of 3.

[Claim 5] The manufacture approach of the light filter of claim 1 whose concentration of the anionic color in an ink constituent is 1 – 10% thru/or any 1 term of 4.

[Claim 6] The manufacture approach of the light filter of claim 1 which does not contain substantially any solvents other than an amide series solvent in an ink constituent thru/or any 1 term of 5.

[Claim 7] The manufacture approach of the light filter of claim 1 whose anionic color tingibility polymer is resin which has the 3rd class amino group thru/or any 1 term of 6.

[Claim 8] The manufacture approach of the light filter of claim 1 by which the bridge formation body whorl of an anionic color tingibility polymer is patternized by the form corresponding to the configuration of the pixel of a liquid crystal display component thru/or any 1 term of 7.

[Claim 9] The manufacture approach of the light filter of claim 1 by which the bridge formation body whorl of an anionic color tingibility polymer is patternized by the form corresponding to the configuration of the pixel of a liquid crystal display component, and the black matrix is formed between patterns thru/or any 1 term of 8.

[Claim 10] The manufacture approach of the light filter of claim 1 whose water treatment is thermic circulation water treatment thru/or any 1 term of 9.

[Claim 11] The manufacture approach of the light filter of claim 1 whose pH of water the temperature of water is 30-100 degrees C, and is 3-7 thru/or any 1 term of 10.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the manufacture approach of a light filter which was excellent in the optical property used for a liquid crystal display device, a color-separation device, a sensor, etc.

[0002]

[Description of the Prior Art] Conventionally, in order to colorize a liquid crystal display component and a solid state image pickup device, the approach of combining the three-primary-colors light filter of red, green and blue, or yellow and Magenta cyanogen is taken. Although it is partly as an approach of forming these light filters, the most fundamental approach is the so-called staining technique. The process of the light filter by the staining technique prepares the coat of protein system naturally-occurring-polymers matter, such as a coat of the synthetic resin which has the transparent cationic radical of the shape of a thin film (it is called a pattern), such as the shape of the shape of SUTORAIIBU, and a mosaic, or gelatin, casein, and GRU, in front faces used as a base, such as glass and a silicon wafer, uses it as a covering color coat, and makes it the basic principle to dye this using a color (coloring). The following three methods are learned as a concrete manufacture process of a light filter.

[0003] (1) Dye the pattern which minds a mask, and is developed [is exposed and] and obtained, and form a coloring layer, after preparing the coat which should be colored in a base front face. Subsequently, the protection coat coat of un-coloring nature is prepared in the whole surface, and the coat which should color the 2nd by the same actuation as the above on this is prepared. Hereafter, laminating formation of the coloring layer is carried out serially as occasion demands.

[0004] (2) Perform resist-printing [fixing-cum-] processing of a color with a tannic acid etc. after dyeing the pattern which minds a mask, and is developed [is exposed and] and obtained after preparing the coat which should be colored in a base front face and forming a coloring layer. The coat which should color the 2nd by same actuation is prepared. A coloring layer is made to form on the same base front face as occasion demands below.

[0005] (3) Prepare the coat (covering color coat) which should be colored in a base front face. After preparing the layer of POJIREJISUTO on it, the covering color coat which exposed and developed [mind and] the mask and was exposed in the shape of a pattern is dyed, subsequently a POJIREJISUTO layer is exfoliated, and the coloring section is formed. The actuation after preparing a POJIREJISUTO layer is repeated and the same covering color coat is dyed in various colors in the shape of [desired] a pattern in two or more colors.

[0006] Except for what has the special light filter manufactured in the above processes, it has Y (yellow), M (Magenta) and C (cyanogen) which are R (red), G (green), B (blue), or the complementary color system three primary colors which is usually the primary color system three primary colors, and the coloring layer colored [(M may be omitted) and]. The most important property required of a light filter is an optical property, and the spectral characteristic of each coloring layer will govern worth of a final product greatly.

[0007] Moreover, as opposed to the sputtering process for preparing heat treatment which

encounters at the process which manufactures the liquid crystal display equipped with a light filter, for example, a transparent electrode layer, it has advanced resistance to the light added as a final product at the time of an activity, and a predetermined optical property is not spoiled. Moreover, the color applied with a natural thing must have good solubility (the rate and solubility of the dissolution) to water, and must be stability in an acid dyeing bath for a long period of time.

[0008] Furthermore, when accompanied by the process which needs fixing processing, the thing of a fixing treatment effect to excel is required. By the way, since protein system polymeric materials, such as gelatin, casein, and GRU, have the cationic radical, it is dyed by the water-soluble anionic color (coloring). Moreover, when replacing with these and using the synthetic-resin base material of a photo-curing mold, it comes to be dyed with a water-soluble anionic color like the protein system naturally-occurring-polymers matter by making a cationic radical hold in a resinous principle.

[0009] Although it has the description that a staining technique can form a very detailed color pattern freely as mentioned above, many production processes, such as a photolithography process of a count according to the number of the colors to dye, a dyeing process, and washing / fixing process, are complicated, and there is also much risk of causing the yield lowering by the dust adhesion under manufacture etc. Moreover, since coloring concentration is proportional to the thickness of the dyeing resin film mostly, fluctuation of thickness serves as an irregular color and it reduces the quality of a product. Depending on the sequence of dyeing, the irregular color by contamination, desorption, etc. of other colors may start. Furthermore, the approach of reducing the routing counter of light filter manufacture, raising the yield, and making more cheaply is strongly demanded by the liquid crystal display component manufacturer.

[0010] Recently, this invention persons are indicating the manufacture approach of the light filter which forms a photopolymer thin film with the very high dye affinity over an anionic color on a transparency substrate, irradiates an energy line, is made to harden this thin film, injects color liquid by the ink jet method to this hardening membrane layer in a predetermined location, and forms the coloring pattern of a high request of concentration or precision to JP,7-77607,A.

[0011]

[Problem(s) to be Solved by the Invention] By the manufacture approach of the light filter by the conventional ink jet method, there is a problem in respect of concentration and much more improvement was desired.

[0012]

[Means for Solving the Problem] this invention person etc. completed this invention, as a result of examining many things, in order to solve this problem. This invention namely, the ink constituent made to dissolve (1) anionic color in the water solution of an amide series solvent It injects by the ink jet method on the transparency substrate which has the bridge formation body whorl of an anionic color tingibility polymer. The manufacture approach of the light filter characterized by carrying out water treatment after drying, (2) The manufacture approach of the light filter the above (1) that an amide series solvent is the compound which does not have active hydrogen, (3) The compound which does not have active hydrogen N-methyl pyrrolidone, N,N-dimethylacetamide, N and N-JIMERU formamide, N, and N-diethyl formamide, N, and N-dimethyl propione amide, N-methyl-epsilon caprolactam, 1,3-dimethyl-2-imidazolidinone or N and N, N', the manufacture approach of the light filter the above (2) which is N'-tetramethylurea, (4) The above (1) whose concentration of the water solution of an amide series solvent is 3 – 40% thru/or the manufacture approach of the light filter of any 1 term of (3), (5) The above (1) whose concentration of the anionic color in an ink constituent is 1 – 10% thru/or the manufacture approach of the light filter of any 1 term of (4), (6) The above (1) which does not contain substantially any solvents other than an amide series solvent in an ink constituent thru/or the manufacture approach of the light filter of any 1 term of (5), (7) The above (1) whose anionic color tingibility polymer is resin which has the 3rd class amino group thru/or the manufacture approach of the light filter of any 1 term of (6), (8) The above (1) by which the bridge formation body whorl of an anionic color tingibility polymer is patternized by the form corresponding to the configuration of the pixel of a liquid crystal display component thru/or the

manufacture approach of the light filter of any 1 term of (7), (9) The bridge formation body whorl of an anionic color tingibility polymer is patternized by the form corresponding to the configuration of the pixel of a liquid crystal display component. And the above (1) by which the black matrix is formed between patterns thru/or the manufacture approach of the light filter of any 1 term of (8), (10) The above (1) whose water treatment is thermic circulation water treatment thru/or the manufacture approach of the light filter of any 1 term of (9), and the temperature of (11) water are 30–100 degrees C, and it is related with the above (1) whose pH of water is 3–7 thru/or the manufacture approach of the light filter of any 1 term of (10).

[0013]

[Embodiment of the Invention] The ink constituent for light filters used for this invention contains the amide series solvent other than an anionic color and water. An anionic color's being independent or the water solution of an amide series solvent which can be mixed with water as a solvent of ink although ink is made as mixture and it is used is used. an amide series solvent — ***** — for example — N — methyl — a pyrrolidone — N,N-dimethylacetamide — N — N — JIMERU — a formamide — N — N — diethyl — a formamide — N — N — dimethyl — propione — an amide — N — methyl — epsilon caprolactam — 1,3-dimethyl-2-imidazolidinone — or — N — N — N — ' — N — ' — tetramethylurea — etc. — active hydrogen — not having — a compound — from the point of dyeing property — desirable — especially — N-methyl pyrrolidone — being desirable . The content of the above-mentioned amide series solvent in an ink constituent is 5 – 25 % of the weight more preferably three to 40% of the weight.

[0014] The color concentration in the ink constituent for light filters used for this invention has [3 – 10 % of the weight] 0.5 – 20 at best especially desirable % of the weight. Generally the mineral salt of a sodium chloride, a sodium sulfate, etc. mixes an anionic color at the time of these coloring matter composition. Furthermore, calcium ion, magnesium ion, etc. which are contained in underwater [general] are mixed with a minute amount. Although it is desirable to remove these mineral as much as possible since these mineral constituents cause corrosion and wear of a printer head, they they not only worsen the solubility and storage stability of coloring matter remarkable, but must set up and manage specification in practice. Although it is necessary to carry out the content to at least 1 or less % of the weight to an anionic color, it is 0.1 or less % of the weight more preferably 0.5 or less % of the weight. Moreover, it is desirable that solvents other than amide series solvents, such as an alcohols solvent, especially solvents other than the amide series solvent which does not have active hydrogen are not substantially included from the point of dyeing property in the ink constituent for light filters used for this invention. Here, not containing substantially is that solvents other than the amide series solvent of the amount which is extent from which dyeing property falls, especially solvents other than the amide series solvent which does not have active hydrogen are not included.

[0015] What is necessary is just to perform it as follows, for example, for manufacturing the ink constituent for light filters used for this invention. That is, after dissolving an anionic color in an amide series solvent water solution and removing mineral by approaches, such as an ultrafiltration method, reverse osmosis, and an ion-exchange method, it is manufactured by considering as desired color concentration by dilution or concentration. The ink constituent used for this invention can contain a part for 0.5 – 20% of the weight of a color, and its 3 – 10 % of the weight is desirable in practice. After being prepared from such a component, it is desirable to carry out liquid filtration using the filter aid of a cellulose type, in order to remove an impurity in addition to this, dust and a foreign matter, and, then to carry out precision filtration with a membrane filter (1 micron of apertures), and to carry out precision filtration with the membrane filter of 0.45 microns or less of apertures further.

[0016] Especially the ink constituent used for this invention by which mixed preparation was carried out as mentioned above is excellent in stability and mothball nature also in various properties, and characteristic in respect of not carrying out blinding of the regurgitation orifice etc. In addition, when adding the stabilizer (sodium-polyacrylate; by Nippon Kayaku Co., Ltd., for example, the kaya KIRETA C-1000 grade), and an antimicrobe and antifungal agents of an ink constituent (for example, DERUTOPPU by Takeda Chemical, Ltd. etc.), it is good to add in the phase before carrying out precision filtration.

[0017] As an anionic color used for an ink constituent, although acid dye, direct dye, reactive dye, etc. are mentioned, for example, especially acid dye is desirable. Specifically as yellow coloring matter For example, C.I.Acid Yellow Said 40: 3 — said — 17 — said — 38 — Said 44: 1 — said — 42 — 1 — said — 49 — said — 61 — said — 65 — said — 67 — said — 72 — said — 79 — said — 110 — said — 114 — said — 116 — said — 117 — said — 119 — said — 121 — said — 127 — said — 129 — said — 135 — said — 141 — said — 143 — said — 155 — said — 158 — said — 161 — said — 194 — said — 204 — said — 207 — said — 220 — said — 232 — 102 and the coloring matter PC Yellow 42P grade for the Nippon Kayaku Co., Ltd. light filters are mentioned. said — 235 — said — 241 and C.I.Direct Yellow12 — said — 86 — said — 87 — said — 130 — said — 142 and C.I.Reactive Yellow 84 — said — As orange coloring matter for example, C.I.Orange10 — said — 19 — said — 33 — said — 50 — said — 56 — said — 67 — said — 80 — said — 108 — said — 122 — said — 142 — said — 166 — said — 130 and C.I.Direct Orange 26 — said — 39 — C.I.Reactive Orange 1 and these 4 grades are mentioned.

[0018] As red dyes For example, C.I.Acid Said 143: Red1 — said — 6 — said — 9 — said — 14 — said — 18 — said — 35 — said — 37 — said — 42 — said — 50 — said — 52 — said — 57 — said — 73 — said — 87 — said — 88 — said — 89 — said — 92 — said — 97 — said — 106 — said — 111 — said — 114 — said — 118 — said — 128 — said — 134 — said — 138 — said — 143 — 1 — said — 145 — said — 158 — said — 183 — said — 186 — said — 211 — said — 214 — said — 215 — said — 217 — said — 219 — said — 225 — said — 226 — said — 249 — said — 254 — said — 256 — said — 257 — said — 259 — said — 260 — said — 261 — said — 263 — said — 266 — said — 274 — said — 276 — said — 278 — said — 289 — said — 299 — said — 301 — said — 303 — said — 307 — said — 315 — said — 316 — said — 317 — said — 336 — said — 337 — said — 341 — said — 355 — said — 357 — said — 359 — said — 362 — said — 366 — said — 383 — said — 399 — said — 405 — said — 407 — said — 414 — said — 416 — said — 426 — C. — I.Direct Red2 — said — 23 — said — 24 — said — 31 — said — 39 — said — 54 — said — 79 — said — 83:1 — said — 89 — said — 224 — said — 225 — said — 226 — said — 227 — said — 242 — said — 243 and C.I.Reactive Red5 — said — 8 — said — 43 — Coloring matter PC Red21P, PC Red136P, PC Red137P, and PC Magenta10P grade are mentioned. and the object for the Nippon Kayaku Co., Ltd. light filters — as purple coloring matter for example, C.I.Acid Violet 21 — said — 42 — said — 43 — said — 47 — said — 48 — said — 49 — said — 54 — said — 97 and these 102 grades are mentioned.

[0019] As blue coloring matter For example, C.I.Acid Blue 7 — said — 9 — said — 15 — said — 22 — said — 23 — said — 25 — said — 40 — said — 45 — said — 47 — said — 59 — said — 61:1 — said — 62 — said — 78 — said — 80 — said — 83 — said — 90 — said — 104 — said — 109 — said — 112 — said — 127 — said — 127:1 — said — 129 — said — 138 — said — 140 — said — 203 — said — 204 — said — 207 — said — 227 — said — 228 — said — 232 — said — 247 — said — 260 — said — 264 — said — 277 — said — 278 — said — 280 — said — 283 — said — 290 — said — 333 — said — 343, Direct Blue 106, and these 108 grades — Coloring matter PC Blue 43P and PCCyan 2P grade are mentioned. and the object for the Nippon Kayaku Co., Ltd. light filters — as green coloring matter for example, C.I.Acid Green3 — said — 5 — said — 22 — said — 25 — said — 27 — said — 28, these 41 grades and coloring matter PC GreenFOP for the Nippon Kayaku Co., Ltd. light filters, and PC Green100P grade are mentioned.

[0020] As pigmentum nigrum For example, C.I.Acid Black1 — said — 26 — said — 31 — said — 48 — said — 50 — said — 52 — said — 52:1 — said — 58 — said — 60 — said — 63:2 — said — 64 — said — 107 — said — 109 — said — 110 — said — 112 — said — 113 — said — 118 — said — 140 — said — 155 — said — 170 — said — 172 — said — 177 — said — 187 — said — 188 — said — 194 — said — 207 — said — 222 and C.I.Direct Black17 — said — 19 — said — 22 — said — 51 — said — 62 — said — 91 — said — 112 — said — 117 — said — 118 — said — 122 — said — 132 — said — 146 — said — 154 — said — 159 — said — 169 — said — 173 etc. is mentioned.

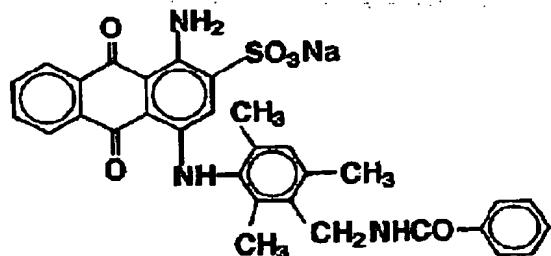
[0021] Acid dye and the coloring matter for light filters are desirable in these coloring matter.

Moreover, although ink is made as mixture and it is used, when it is easy to come out of an irregular color with mixture, it is desirable [these coloring matter] independent or to use the coloring matter which has the structure of a single component. As desirable coloring matter, the following coloring matter is raised, for example.

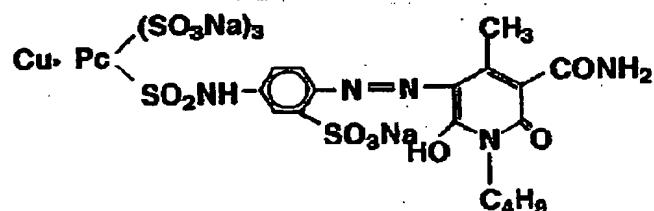
[0022]

[Formula 1]

青色色素化合物 No. 1



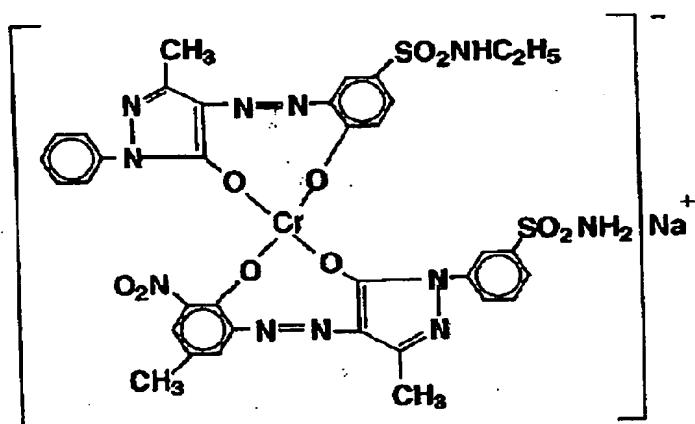
綠色色素化合物 No. 2



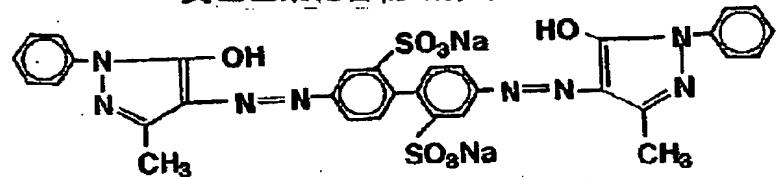
[0023]

[Formula 2]

赤色色素化合物 No. 3



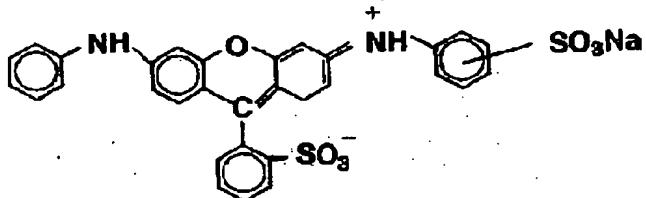
黄色色素化合物 No. 4



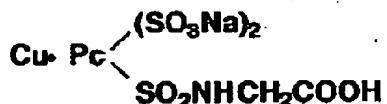
[0024]

[Formula 3]

マゼンタ色素化合物 No. 5



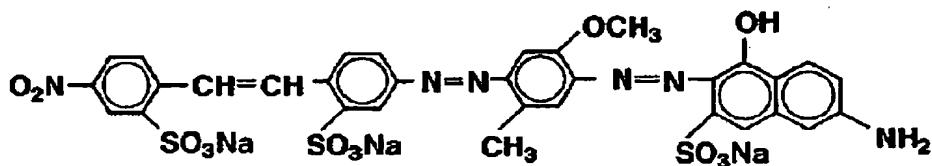
シアン色素化合物 No. 6



[0025]

[Formula 4]

黒色色素化合物 No. 7



[0026] What is necessary is just to perform it as follows, in order to enforce the manufacture approach of the light filter of this invention. That is, the anionic color tingibility photopolymer constituent which uses an anionic color tingibility polymer and a photosensitive compound as an indispensable component is dissolved in solvents, such as methyl-cellosolve acetate, the coat of this photopolymer liquid is carried out to a substrate by approaches, such as a spin coat method, a desiccation postexposure is carried out, this photopolymer is stiffened, and a photopolymer thin film (bridge formation body whorl of an anionic color tingibility polymer) is obtained. The thickness of a photopolymer thin film has desirable 0.2–5 micrometers, and its 0.5–1.5 micrometers are especially desirable. A photopolymer thin film may expose a predetermined pattern through a mask, and it does not prepare, but a pattern may be exposed completely and it may stiffen it. When preparing a pattern, a septum may be made as a black matrix in the gap of a pattern. Even when it exposes a dyeing thin film through a mask, and it may form the predetermined pattern, exposes it completely and has no pattern, it is good.

[0027] Every color and multicolor coincidence are sufficient as dyeing (coloring) by the ink jet method. A 70–180-degree C hot plate or oven performs stoving processing for 3 – 15 minutes after dyeing. Water treatment is performed in order to make the color printed on the after-staining thin film fully color. As water, what is pH 3–7 is more preferably used at 60–80 degrees C the temperature of 30–100 degrees C. For pH adjustment of this water, low-grade carboxylic acids, such as an organic acid especially an acetic acid, a propionic acid, oxalic acid, a malonic acid, a succinic acid, a tartaric acid, and a malic acid, are used preferably. However, since it is not fixing processing, fixing processing agents, such as tannin, are not contained in this water. As the water treatment approach, dipping or shower processing is good. Furthermore, a transparent protective layer is coated on a dyeing thin film on the whole surface in order to protect the light filter layer after desiccation.

[0028] It is the description that there is dramatically little desorption of the color under above-mentioned water treatment, and the print object of the dyeing thin film by the ink constituent containing the anionic color used for this invention and an amide series solvent makes advantageous the manufacture approach of the light filter of this invention.

[0029] If it is a transparent and colorless plate as a substrate used for this invention, there will be especially no limit, for example, plates, such as glass, polyester, a polycarbonate, polyacrylate,

and polyether sulphone, will be raised. The thickness has about 0.5–1.5 goodmm.

[0030] The bridge formation object of an anionic color tingibility polymer used for this invention stiffens the anionic color tingibility photopolymer which uses an anionic color tingibility polymer and a photosensitive compound as an indispensable component. An anionic color tingibility polymer uses hydrophilic monomers other than an anionic color tingibility monomer and an anionic color tingibility monomer (only henceforth "a hydrophilic monomer") as an indispensable component. This anionic color tingibility polymer can be created by using a well-known solution polymerization method conventionally.

[0031] An anionic color tingibility monomer is a monomer which has for example, the 3rd class nitrogen or the 4th class nitrogen in the molecule, and has the property which gives the tinctorial power of an anionic color to the polymer here. Specifically For example, (N and N–dimethylamino), ethyl acrylate, Ethyl methacrylate, ethyl acrylate (N and N–diethylamino), (N and N–dimethylamino) Ethyl methacrylate, 3–(N and N–dimethylamino) propylacrylate, (N and N–diethylamino) Alkyl (C(N and N–JI (C1 – C4) alkylamino) 1 – C4) (meta) acrylate, such as 3–(N and N–dimethylamino) propyl methacrylate, Alkyl (C(N and N–JI (C1 – C4) alkylamino) 1 – C4) (meta) acrylamides, such as 3–(N and N–dimethylamino) propyl acrylamide and 3–(N and N–dimethylamino) propyl methacrylamide, (Although N and N–diethylamino ethyl vinyl ether, 4–vinylpyridine, diarylamine, 2–hydroxy–3–methacryloyl oxypropyl trimethyl ammonium chloride, and methacryloxy–ethyl trimethylammonium chloride are mentioned) If the monomer of points (meta), such as stability, to an acrylamide system is desirable and takes into consideration especially the dyeing property of an anionic color The monomer of the acrylamide system which has the 3rd class nitrogen, such as the monomer which has the 3rd class nitrogen in the molecule, for example, 3–(N and N–dimethylamino) propyl acrylamide, and 3–(N and N–dimethylamino) propyl methacrylamide, in the molecule (meta) is the most desirable. These anionic color tingibility monomers are independent, or they are used by two or more sorts, mixing.

[0032] Moreover, as a hydrophilic monomer, acrylamide (meta), vinyl pyrrolidone, etc. with which two alkyl groups (C1 – C4) may combine one **, such as hydroxy (C1 – C4) alkyl (meta) acrylate, such as hydroxyethyl acrylate and hydroxyethyl methacrylate, acrylamide, methacrylamide, dimethylamino acrylamide, and methylamino acrylamide, are mentioned, for example. These hydrophilic monomers are independent, or they are used by two or more sorts, mixing.

[0033] The blending ratio of coal of these anionic color tingibility monomers and hydrophilic monomers has [25 – 85 % of the weight of anionic color tingibility monomers / 15 – 75 % of the weight of hydrophilic monomers] 20 – 70 % of the weight preferably desirable 30 to 80% of the weight preferably.

[0034] As a photosensitive compound, for example A diazido chalcone, 4, the 4'–diazido stilbene –2, a 2'–disulfon acid, 4, the 4'–diazido stilbene –2, 2'–disulfon acid sodium, 4, the 4'–diazido stilbene –2, a 2'–disulfon acid (screw (methoxy ethyl)) amide, 4 and 4'–diazido stilbene –2 and 2 — '4, such as – disulfon acid (screw (ethoxyethyl)) amide, 4' – diazido stilbene –2 and 2' — azide compounds, such as – disulfon acid (mono–** is screw (C1 – C4) (alkoxy (C1 – C4) alkyl)) amide, — The acrylic compound which has two or more well-known functional groups conventionally is mentioned. These photosensitive compounds are independent, and ** is used by two or more sorts, mixing. When using an azide compound as a photosensitive compound, it is desirable to use about 2 to 15% of the weight to an anionic color tingibility polymer, and it is desirable to use about 3 to 8% of the weight especially.

[0035] in addition, the compound which has acryloyl (meta) radicals other than the above-mentioned anionic color tingibility monomer and a hydrophilic monomer — the anionic color tingibility polymer 100 weight section — receiving — 0.1 – 10 weight section — a cure rate goes up and is desirable when 0.5–6 weight section extent addition is carried out especially. (Meta) As a compound which has an acryloyl radical For example, 3, 9-screw (2-acryloyloxy –1, 1-dimethyl) 2, 4, and 8, and spiroglycol diacrylate [10-tetraoxaspiro [5, 5] undecane] cyclohexane dimethylol diacrylate, Ethylene glycol diacrylate, diethylene glycol diacrylate, Triethylene glycol diacrylate, polyethylene–glycol diacrylate, Polypropylene–glycol diacrylate, butylene–glycol diacrylate, Neopentyl glycol diacrylate, 1,4–butanediol diacrylate, 1,6–hexanediol diacrylate, pentaerythritol

diacrylate, A pentaerythritol thoria chestnut rate, trimethylolpropane triacrylate, Novolak system epoxy acrylate, bisphenol A system epoxy acrylate, Alkylene glycol diepoxy acrylate, glycidyl ester acrylate, Polyester system diacrylate, bisphenol A system diacrylate, Urethane system diacrylate, methylenebis acrylamide, ethylene glycol dimethacrylate, Diethylene-glycol dimethacrylate, triethylene glycol dimethacrylate, Polyethylene glycol dimethacrylate, propylene glycol dimethacrylate, Petit RENGU recall dimethacrylate, neopentyl glycol dimethacrylate, 1,4-butanediol dimethacrylate, 1, 6-hexanedioldimethacrylate, trimethylolpropanetrimethacrylate, etc. are mentioned.

[0036] When using the acrylic compound which has two or more well-known functional groups conventionally as a photosensitive compound, it is desirable to use about 10 to 40% of the weight to an anion color tingibility polymer, and it is desirable to use about 15 to 35% of the weight especially. In this case, a photosensitizer may be used together.

[0037] When the reinforcement of the photo-curing object of the anionic color tingibility polymer which consists of a copolymerization object of an anionic color tingibility monomer and a hydrophilic monomer is inadequate, the reinforcement can be raised if a hydrophobic monomer is used together as a monomer which constitutes this polymer. As a hydrophobic monomer, the alkyl ester of acrylic acids (meta), such as methyl acrylate, methyl methacrylate, ethyl acrylate, butyl acrylate, butyl methacrylate, 2-ethylhexyl acrylate, and 2-ethylhexyl methacrylate, styrene, p-methyl styrene, etc. are mentioned, for example. It is [20 – 70 % of the weight of anionic color tingibility monomers / 10 – 60 % of the weight of hydrophilic monomers / 10 – 50 % of the weight of hydrophobic monomers] preferably desirable [the blending ratio of coal of an anionic color tingibility monomer, a hydrophilic monomer, and a hydrophobic monomer / 20 to 50% of the weight] 25 to 60% of the weight preferably that it is 20 – 40 % of the weight preferably.

moreover, the molecular weight of the anionic color tingibility polymer created by doing in this way — desirable — 5,000–200,000 — 10,000 to about 100,000 are still more preferably good.

[0038] The anionic color tingibility photopolymer constituent which consists of the above presentation is used usually diluting it with an organic solvent etc. Although methyl cellosolve, ethyl ROSESORUBU, TOSOPURO pill cellosolve, ethylene glycol monoethyl ether acetate, diethylene-glycol wood ether, diethylene-glycol diethylether, a methyl ethyl ketone, a methoxy isopropyl glycol, etc. are mentioned as an organic solvent, the isopropyl cellosolves from a point and diethylene-glycol wood ether, such as spreading nature, are desirable. These are independent, or they are used by two or more sorts, mixing. Although it cannot generally specify since the rate of the organic solvent occupied in this photopolymer liquid changes with presentations occupied in these resin liquid, it is desirable to make resin liquid become the viscosity which can be applied to a substrate front face. In addition, since when using an azide compound as a photosensitive compound avoids the decomposition and side reaction, the moisture content in photopolymer liquid is desirable for 1 or less % of the weight.

[0039] As an example of a photopolymer constituent, the photopolymer constituent currently indicated by JP,62-194203,A is desirable. As photopolymer liquid, CFR633DHP, CFR633L1 (all are the Nippon Kayaku Co., Ltd. make), etc. are mentioned, for example. An anionic color tingibility polymer has desirable resin which has the 3rd class amino group in respect of dyeing property, thermal resistance, etc.

[0040]

[Example] Hereafter, the example of reference and an example explain this invention still more concretely.

Example of reference Preparation of anionic color tingibility photopolymer liquid 3-(N and N-dimethylamino) propyl acrylamide The 38 sections 2-hydroxyethyl methacrylate The 15 sections Dimethylamino acrylamide The ten sections Vinyl pyrrolidone The seven sections Methyl methacrylate The eight sections Methyl acrylate The polymerization of the monomer of the 22 section above-mentioned formula is carried out by the well-known solution polymerization method, and it dries until it becomes less than [ejection moisture content 1 w/w%] about this polymer (average molecular weight 90,000) after supplying in a lot of isopropyl ether and making the amount of polymer precipitate. This desiccation polymer 100 section is made to carry out the mixed dissolution of 4, the 4'-diazido chalcone 2 section, 4, the 4'-diazido stilbene -2, the 2'-

disulfon acid (screw (ethoxyethyl)) amide 6 section, the silane coupler KBM603(Shin-Etsu Chemical Co., Ltd.) 2 section, the isopropyl cellosolve 450 section, and the diethylene-glycol wood ether 450 section, and photopolymer liquid of 1 or less % of the weight of moisture contents is obtained.

[0041] The CFR633DHP(Nippon Kayaku Co., Ltd. make)100 section and the silane coupling agent KBM603 (Shin-Etsu Chemical Co., Ltd. make) 0.05 section which dissolved in the solvent the anionic color tingibility polymer and azide compound which are obtained by copolymerizing an example 1 anionic color tingibility monomer, a hydrophilic monomer, and a hydrophobic monomer and which are anionic color tingibility photopolymer liquid are mixed. The coat of this is carried out on a glass substrate with a spin coat method, and it lets a band-conveyor type UV irradiation machine pass after desiccation for 3 minutes at 110 degrees C, and is light exposure 150 mJ/cm². It exposes completely and is made to harden. In this way, it positions precisely by the optical place method, and the glass substrate which has the formed dyed thin film (bridge formation body whorl of an anion color tingibility polymer) is set to an ink jet printer.

[0042] Subsequently, blue coloring matter compound No.1 The five sections, N-methyl pyrrolidone The heating dissolution of the mixture which consists of the 20 sections and the water 75 section is carried out, and blue ink is prepared through a 0.2-micrometer membrane filter. Independently, it is green coloring matter compound No.2. The five sections, N-methyl pyrrolidone The 20 sections, water The heating dissolution of the mixture which consists of the 75 sections is carried out, and green ink is prepared through a 0.2-micrometer membrane filter. Furthermore, the red-dyes compound No.35 section, N-methyl pyrrolidone The 20 sections, water The heating dissolution of the mixture which consists of the 75 sections is carried out, and red ink is prepared through a 0.2-micrometer membrane filter.

[0043] The above-mentioned blue ink is injected by the ink jet, and it is made to adhere to the part which should be colored the blue of this dyed thin film. Next, the above-mentioned green ink is injected to this dyeing thin film by the ink jet, and it is made to adhere to the part which should be colored the green of this dyeing thin film. The above-mentioned red ink is injected to this dyeing thin film by the ink jet, and it is made to adhere to the part which should be colored the red of this dyeing thin film finally. Stoving of this is carried out for 10 minutes on the hot plate heated at 150 degrees C. Next, after carrying out shower processing of the printed glass substrate for 5 minutes with the warm water of 70-degree-CpH7, it dried for 10 minutes at 130 degrees C, and the light filter of R-G-B 3 color was obtained. In this way, the light filter of R-G-B 3 obtained color is about 150-micrometer almost circular pattern respectively, and has the engine performance equivalent to the light filter formed by the so-called conventional staining technique.

[0044] The CFR633L1 (Nippon Kayaku Co., Ltd. make) 100 section and the silane coupling agent KBM603 (Shin-Etsu Chemical Co., Ltd. make) 0.05 section which dissolved in the solvent the compound which has acryloyl (meta) radicals other than the anionic color tingibility polymer, azide compound and anionic color tingibility monomer which are made to carry out copolymerization of an example 2 anionic color tingibility monomer, a hydrophilic monomer, and the hydrophobic monomer, and are obtained, and a hydrophilic monomer and which are anionic color tingibility photopolymer liquid are mixed. The coat of this is carried out on the glass substrate which has a black stripe made from a pigment-content powder resist with a spin coat method, and it exposes completely and is made to harden from an after [desiccation] glass side for 3 minutes at 110 degrees C. Then, it is immersed in a tetramethyl hydroxide water solution 2%, negatives are developed, it dries for 20 minutes at 150 degrees C after rinsing, and the high dye affinity resin film (bridge formation body whorl of an anionic color tingibility polymer) which has a black stripe on a substrate is obtained. It positions precisely and this glass substrate is set to an ink jet printer.

[0045] Subsequently, yellow coloring matter compound No.4 The two sections, N-methyl pyrrolidone The heating dissolution of the mixture which consists of the ten sections and the water 88 section is carried out, and yellow ink is prepared through a 0.2-micrometer membrane filter. Independently, it is Magenta coloring matter compound No.5. The two sections, N-methyl pyrrolidone The ten sections, water The heating dissolution of the mixture which consists of the

88 sections is carried out, and Magenta color ink is prepared through a 0.2-micrometer membrane filter. Furthermore, cyanogen coloring matter compound No.6 The two sections, N-methyl pyrrolidone The ten sections, water The heating dissolution of the mixture which consists of the 88 sections is carried out, and cyanogen color ink is prepared through a 0.2-micrometer membrane filter.

[0046] The above-mentioned yellow ink is injected by the ink jet, and it is made to adhere to the part which should be colored the yellow of this dyed thin film. Next, the above-mentioned Magenta color ink is injected to this dyeing thin film by the ink jet, and it is made to adhere to the part which should be colored the Magenta color of this dyeing thin film. The above-mentioned cyanogen color ink is injected to this dyeing thin film by the ink jet, and it is made to adhere to the part which should be colored the cyanogen color of this dyeing thin film finally. The 70-degree C warm water (pH 3 [about]) which contains stoving and 0.2% of acetic acids like an example 1 after this performed shower processing, and the light filter of Y-M-C 3 color was obtained.

[0047] The example 3CFR633L1 (Nippon Kayaku Co., Ltd. make) 100 section and the silane coupling agent KBM603 (Shin-Etsu Chemical Co., Ltd. make) 0.05 section are mixed. Revolution spreading of this is carried out so that it may become 1.5-micrometer thickness with a spinner on a glass substrate, and negatives are exposed and developed using the mask after desiccation for 20 minutes at 90 degrees C, and a stripe pattern with a line breadth [of 20 micrometers] and a line spacing of 120 micrometers is formed. In this way, the substrate which has the obtained stripe pattern is positioned to accuracy, and it sets to an ink jet printer. Subsequently, pigmentum-nigrum compound No.7 The six sections, N-methyl pyrrolidone The 20 sections, water The heating dissolution of the mixture which consists of the 74 sections is carried out, and black ink is prepared through a 0.2-micrometer membrane filter.

[0048] The above-mentioned black ink is injected by the ink jet, and a stripe pattern is dyed black. It is immersed into the solution which dries this for 10 minutes at 150 degrees C, and, subsequently to 1l. of water, contains tannin 3g, 1g of tartar emetics, and 3g of acetic acids, and fixing processing is performed and it dries. Then, CFR 633L1 is applied on the substrate which has this black stripe, the same actuation as an example 2 is performed, and a light filter is obtained.

[0049]

[Effect of the Invention] The ink constituent used by this invention has the high solubility of a color, is excellent in stability with the passage of time, and does not start the blinding of an ink jet printer head. This ink constituent has the operation which raises the compatibility of a color to the high dye affinity photopolymer thin film used by this invention, and lessens a blot of a color dramatically. Therefore, the high coloring pattern of precision can be obtained. If the ink constituent used especially by this invention and the resin which has the 3rd class amino group as an anionic color tingibility polymer are combined, a light filter with high concentration will be obtained only by water treatment, without carrying out fixing processing. It is not necessary to perform pattern NINGU and the dye fixing treatment like the conventional dyeing 3 times each, and, according to this invention, a process is simplified remarkably. Moreover, the yield lowering by dust adhesion at the development process and a dyeing process like before also decreases dramatically. Moreover, control of the injection location of the color liquid by the ink jet method is easy, and precision can also reply to user need enough.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application] This invention relates to the manufacture approach of a light filter which was excellent in the optical property used for a liquid crystal display device, a color-separation device, a sensor, etc.

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PRIOR ART

[Description of the Prior Art] Conventionally, in order to colorize a liquid crystal display component and a solid state image pickup device, the approach of combining the three-primary-colors light filter of red, green and blue, or yellow and Magenta cyanogen is taken. Although it is partly as an approach of forming these light filters, the most fundamental approach is the so-called staining technique. The process of the light filter by the staining technique prepares the coat of protein system naturally-occurring-polymers matter, such as a coat of the synthetic resin which has the transparent cationic radical of the shape of a thin film (it is called a pattern), such as the shape of the shape of SUTORAIHU, and a mosaic, or gelatin, casein, and GRU, in front faces used as a base, such as glass and a silicon wafer, uses it as a covering color coat, and makes it the basic principle to dye this using a color (coloring). The following three methods are learned as a concrete manufacture process of a light filter.

[0003] (1) Dye the pattern which minds a mask, and is developed [is exposed and] and obtained, and form a coloring layer, after preparing the coat which should be colored in a base front face. Subsequently, the protection coat coat of un-coloring nature is prepared in the whole surface, and the coat which should color the 2nd by the same actuation as the above on this is prepared. Hereafter, laminating formation of the coloring layer is carried out serially as occasion demands.

[0004] (2) Perform resist-printing [fixing-cum-] processing of a color with a tannic acid etc. after dyeing the pattern which minds a mask, and is developed [is exposed and] and obtained after preparing the coat which should be colored in a base front face and forming a coloring layer. The coat which should color the 2nd by same actuation is prepared. A coloring layer is made to form on the same base front face as occasion demands below.

[0005] (3) Prepare the coat (covering color coat) which should be colored in a base front face. After preparing the layer of POJIREJISUTO on it, the covering color coat which exposed and developed [mind and] the mask and was exposed in the shape of a pattern is dyed, subsequently a POJIREJISUTO layer is exfoliated, and the coloring section is formed.

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EFFECT OF THE INVENTION

[Effect of the Invention] The ink constituent used by this invention has the high solubility of a color, is excellent in stability with the passage of time, and does not start the blinding of an ink jet printer head. This ink constituent has the operation which raises the compatibility of a color to the high dye affinity photopolymer thin film used by this invention, and lessens a blot of a color dramatically. Therefore, the high coloring pattern of precision can be obtained. If the ink constituent used especially by this invention and the resin which has the 3rd class amino group as an anionic color tingibility polymer are combined, a light filter with high concentration will be obtained only by water treatment, without carrying out fixing processing. It is not necessary to perform pattern NINGU and the dye fixing treatment like the conventional dyeing 3 times each, and, according to this invention, a process is simplified remarkably. Moreover, the yield lowering by dust adhesion at the development process and a dyeing process like before also decreases dramatically. Moreover, control of the injection location of the color liquid by the ink jet method is easy, and precision can also reply to user need enough.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the manufacture approach of the light filter by the conventional ink jet method, there is a problem in respect of concentration and much more improvement was desired.

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MEANS

[Means for Solving the Problem] this invention person etc. completed this invention, as a result of examining many things, in order to solve this problem. This invention namely, the ink constituent made to dissolve (1) anionic color in the water solution of an amide series solvent It injects by the ink jet method on the transparency substrate which has the bridge formation body whorl of an anionic color tingibility polymer. The manufacture approach of the light filter characterized by carrying out water treatment after drying, (2) The manufacture approach of the light filter the above (1) that an amide series solvent is the compound which does not have active hydrogen, (3) The compound which does not have active hydrogen N-methyl pyrrolidone, N,N-dimethylacetamide, N and N-JIMERU formamide, N, and N-diethyl formamide, N, and N-dimethyl propione amide, N-methyl-epsilon caprolactam, 1,3-dimethyl-2-imidazolidinone or N and N, N', the manufacture approach of the light filter the above (2) which is N'-tetramethylurea, (4) The above (1) whose concentration of the water solution of an amide series solvent is 3 – 40% thru/or the manufacture approach of the light filter of any 1 term of (3), (5) The above (1) whose concentration of the anionic color in an ink constituent is 1 – 10% thru/or the manufacture approach of the light filter of any 1 term of (4), (6) The above (1) which does not contain substantially any solvents other than an amide series solvent in an ink constituent thru/or the manufacture approach of the light filter of any 1 term of (5), (7) The above (1) whose anionic color tingibility polymer is resin which has the 3rd class amino group thru/or the manufacture approach of the light filter of any 1 term of (6), (8) The above (1) by which the bridge formation body whorl of an anionic color tingibility polymer is patternized by the form corresponding to the configuration of the pixel of a liquid crystal display component thru/or the manufacture approach of the light filter of any 1 term of (7), (9) The bridge formation body whorl of an anionic color tingibility polymer is patternized by the form corresponding to the configuration of the pixel of a liquid crystal display component. And the above (1) by which the black matrix is formed between patterns thru/or the manufacture approach of the light filter of any 1 term of (8), (10) The above (1) whose water treatment is thermic circulation water treatment thru/or the manufacture approach of the light filter of any 1 term of (9), and the temperature of (11) water are 30–100 degrees C, and it is related with the above (1) whose pH of water is 3–7 thru/or the manufacture approach of the light filter of any 1 term of (10).
[0013]

[Embodiment of the Invention] The ink constituent for light filters used for this invention contains the amide series solvent other than an anionic color and water. An anionic color's being independent or the water solution of an amide series solvent which can be mixed with water as a solvent of ink although ink is made as mixture and it is used is used. an amide series solvent — **** — for example — N — methyl — a pyrrolidone — N,N-dimethylacetamide — N — N — JIMERU — a formamide — N — N — diethyl — a formamide — N — N — dimethyl — propione — an amide — N — methyl — epsilon caprolactam — 1,3-dimethyl-2-imidazolidinone — or — N — N — N — ' — N — ' — tetramethylurea — etc. — active hydrogen — not having — a compound — from the point of dyeing property — desirable — especially — N-methyl pyrrolidone — being desirable . The content of the above-mentioned amide series solvent in an ink constituent is 5 – 25 % of the weight more preferably three to 40% of the weight.

[0014] The color concentration in the ink constituent for light filters used for this invention has [3 – 10 % of the weight] 0.5 – 20 at best especially desirable % of the weight. Generally the mineral salt of a sodium chloride, a sodium sulfate, etc. mixes an anionic color at the time of these coloring matter composition. Furthermore, calcium ion, magnesium ion, etc. which are contained in underwater [general] are mixed with a minute amount. Although it is desirable to remove these mineral as much as possible since these mineral constituents cause corrosion and wear of a printer head, they not only worsen the solubility and storage stability of coloring matter remarkable, but must set up and manage specification in practice. Although it is necessary to carry out the content to at least 1 or less % of the weight to an anionic color, it is 0.1 or less % of the weight more preferably 0.5 or less % of the weight. Moreover, it is desirable that solvents other than amide series solvents, such as an alcohols solvent, especially solvents other than the amide series solvent which does not have active hydrogen are not substantially included from the point of dyeing property in the ink constituent for light filters used for this invention. Here, not containing substantially is that solvents other than the amide series solvent of the amount which is extent from which dyeing property falls, especially solvents other than the amide series solvent which does not have active hydrogen are not included.

[0015] What is necessary is just to perform it as follows, for example, for manufacturing the ink constituent for light filters used for this invention. That is, after dissolving an anionic color in an amide series solvent water solution and removing mineral by approaches, such as an ultrafiltration method, reverse osmosis, and an ion-exchange method, it is manufactured by considering as desired color concentration by dilution or concentration. The ink constituent used for this invention can contain a part for 0.5 – 20% of the weight of a color, and its 3 – 10 % of the weight is desirable in practice. After being prepared from such a component, it is desirable to carry out liquid filtration using the filter aid of a cellulose type, in order to remove an impurity in addition to this, dust and a foreign matter, and, then to carry out precision filtration with a membrane filter (1 micron of apertures), and to carry out precision filtration with the membrane filter of 0.45 microns or less of apertures further.

[0016] Especially the ink constituent used for this invention by which mixed preparation was carried out as mentioned above is excellent in stability and mothball nature also in various properties, and characteristic in respect of not carrying out blinding of the regurgitation orifice etc. In addition, when adding the stabilizer (sodium-polyacrylate; by Nippon Kayaku Co., Ltd., for example, the kaya KIRETA C-1000 grade), and an antimicrobe and antifungal agents of an ink constituent (for example, DERUTOPPU by Takeda Chemical, Ltd. etc.), it is good to add in the phase before carrying out precision filtration.

[0017] As an anionic color used for an ink constituent, although acid dye, direct dye, reactive dye, etc. are mentioned, for example, especially acid dye is desirable. Specifically as yellow coloring matter For example, C.I.Acid Yellow Said 40: 3 — said — 17 — said — 38 — Said 44: 1 — said — 42 — 1 — said — 49 — said — 61 — said — 65 — said — 67 — said — 72 — said — 79 — said — 110 — said — 114 — said — 116 — said — 117 — said — 119 — said — 121 — said — 127 — said — 129 — said — 135 — said — 141 — said — 143 — said — 155 — said — 158 — said — 161 — said — 194 — said — 204 — said — 207 — said — 220 — said — 232 — 102 and the coloring matter PC Yellow 42P grade for the Nippon Kayaku Co., Ltd. light filters are mentioned. said — 235 — said — 241 and C.I.Direct Yellow12 — said — 86 — said — 87 — said — 130 — said — 142 and C.I.Reactive Yellow 84 — said — As orange coloring matter for example, C.I.Orange10 — said — 19 — said — 33 — said — 50 — said — 56 — said — 67 — said — 80 — said — 108 — said — 122 — said — 142 — said — 166 — said — 130 and C.I.Direct Orange 26 — said — 39 — C.I.Reactive Orange 1 and these 4 grades are mentioned.

[0018] As red dyes For example, C.I.Acid Said 143: Red1 — said — 6 — said — 9 — said — 14 — said — 18 — said — 35 — said — 37 — said — 42 — said — 50 — said — 52 — said — 57 — said — 73 — said — 87 — said — 88 — said — 89 — said — 92 — said — 97 — said — 106 — said — 111 — said — 114 — said — 118 — said — 128 — said — 134 — said — 138 — said — 143 — 1 — said — 145 — said — 158 — said — 183 — said — 186 — said — 211 — said — 214 — said — 215 — said — 217 — said — 219 — said — 225 — said — 226 —

said — 249 — said — 254 — said — 256 — said — 257 — said — 259 — said — 260 — said — 261 — said — 263 — said — 266 — said — 274 — said — 276 — said — 278 — said — 289 — said — 299 — said — 301 — said — 303 — said — 307 — said — 315 — said — 316 — said — 317 — said — 336 — said — 337 — said — 341 — said — 355 — said — 357 — said — 359 — said — 362 — said — 366 — said — 383 — said — 399 — said — 405 — said — 407 — said — 414 — said — 416 — said — 426 — C. — I.Direct Red2 — said — 23 — said — 24 — said — 31 — said — 39 — said — 54 — said — 79 — said — 83:1 — said — 89 — said — 224 — said — 225 — said — 226 — said — 227 — said — 242 — said — 243 and C.I.Reactive Red5 — said — 8 — said — 43 — Coloring matter PC Red21P, PC Red136P, PC Red137P, and PC Magenta10P grade are mentioned. and the object for the Nippon Kayaku Co., Ltd. light filters — as purple coloring matter for example, C.I.Acid Violet 21 — said — 42 — said — 43 — said — 47 — said — 48 — said — 49 — said — 54 — said — 97 and these 102 grades are mentioned.

[0019] As blue coloring matter For example, C.I.Acid Blue 7 — said — 9 — said — 15 — said — 22 — said — 23 — said — 25 — said — 40 — said — 45 — said — 47 — said — 59 — said — 61:1 — said — 62 — said — 78 — said — 80 — said — 83 — said — 90 — said — 104 — said — 109 — said — 112 — said — 127 — said — 127:1 — said — 129 — said — 138 — said — 140 — said — 203 — said — 204 — said — 207 — said — 227 — said — 228 — said — 232 — said — 247 — said — 260 — said — 264 — said — 277 — said — 278 — said — 280 — said — 283 — said — 290 — said — 333 — said — 343, Direct Blue 106, and these 108 grades — Coloring matter PC Blue 43P and PCCyan 2P grade are mentioned. and the object for the Nippon Kayaku Co., Ltd. light filters — as green coloring matter for example, C.I.Acid Green3 — said — 5 — said — 22 — said — 25 — said — 27 — said — the coloring matter PC GreenFOP for 28, these 41 grades, and the Nippon Kayaku Co., Ltd. light filters and PC Green100P grade are mentioned.

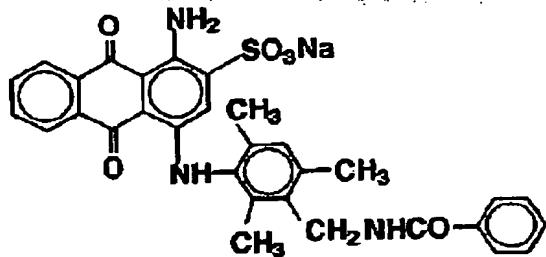
[0020] As pigmentum nigrum For example, C.I.Acid Black1 — said — 26 — said — 31 — said — 48 — said — 50 — said — 52 — said — 52:1 — said — 58 — said — 60 — said — 63:2 — said — 64 — said — 107 — said — 109 — said — 110 — said — 112 — said — 113 — said — 118 — said — 140 — said — 155 — said — 170 — said — 172 — said — 177 — said — 187 — said — 188 — said — 194 — said — 207 — said — 222 and C.I.Direct Black17 — said — 19 — said — 22 — said — 51 — said — 62 — said — 91 — said — 112 — said — 117 — said — 118 — said — 122 — said — 132 — said — 146 — said — 154 — said — 159 — said — 169 — said — 173 etc. is mentioned.

[0021] Acid dye and the coloring matter for light filters are desirable in these coloring matter. Moreover, although ink is made as mixture and it is used, when it is easy to come out of an irregular color with mixture, it is desirable [these coloring matter] independent or to use the coloring matter which has the structure of a single component. As desirable coloring matter, the following coloring matter is raised, for example.

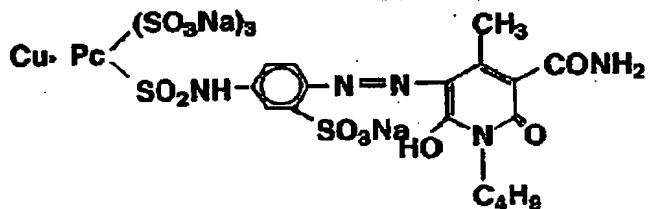
[0022]

[Formula 1]

青色色素化合物 No. 1



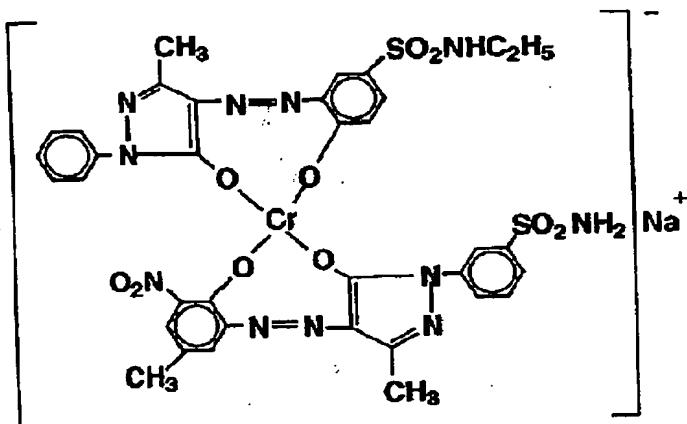
綠色色素化合物 No. 2



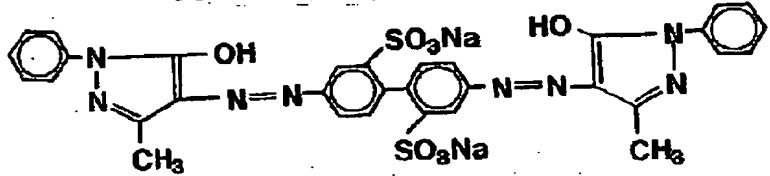
[0023]

[Formula 2]

赤色色素化合物 No. 3



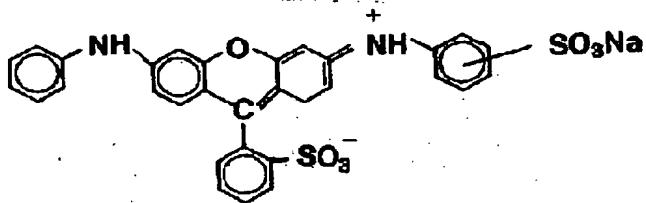
黄色色素化合物 No. 4



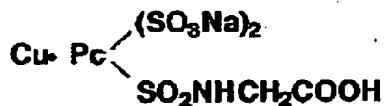
[0024]

[Formula 3]

マゼンタ色素化合物 No. 5



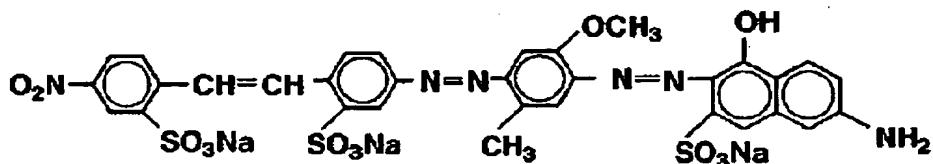
シアン色素化合物 No. 6



[0025]

[Formula 4]

黒色色素化合物 No. 7



[0026] What is necessary is just to perform it as follows, in order to enforce the manufacture approach of the light filter of this invention. That is, the anionic color tingibility photopolymer constituent which uses an anionic color tingibility polymer and a photosensitive compound as an indispensable component is dissolved in solvents, such as methyl-cellosolve acetate, the coat of this photopolymer liquid is carried out to a substrate by approaches, such as a spin coat method, a desiccation postexposure is carried out, this photopolymer is stiffened, and a photopolymer thin film (bridge formation body whorl of an anionic color tingibility polymer) is obtained. The thickness of a photopolymer thin film has desirable 0.2–5 micrometers, and its 0.5–1.5 micrometers are especially desirable. A photopolymer thin film may expose a predetermined pattern through a mask, and it does not prepare, but a pattern may be exposed completely and it may stiffen it. When preparing a pattern, a septum may be made as a black matrix in the gap of a pattern. Even when it exposes a dyeing thin film through a mask, and it may form the predetermined pattern, exposes it completely and has no pattern, it is good.

[0027] Every color and multicolor coincidence are sufficient as dyeing (coloring) by the ink jet method. A 70–180-degree C hot plate or oven performs stoving processing for 3 – 15 minutes after dyeing. Water treatment is performed in order to make the color printed on the after-staining thin film fully color. As water, what is pH 3–7 is more preferably used at 60–80 degrees C the temperature of 30–100 degrees C. For pH adjustment of this water, low-grade carboxylic acids, such as an organic acid especially an acetic acid, a propionic acid, oxalic acid, a malonic acid, a succinic acid, a tartaric acid, and a malic acid, are used preferably. However, since it is not fixing processing, fixing processing agents, such as tannin, are not contained in this water. As the water treatment approach, dipping or shower processing is good. Furthermore, a transparent protective layer is coated on a dyeing thin film on the whole surface in order to protect the light filter layer after desiccation.

[0028] It is the description that there is dramatically little desorption of the color under above-mentioned water treatment, and the print object of the dyeing thin film by the ink constituent containing the anionic color used for this invention and an amide series solvent makes advantageous the manufacture approach of the light filter of this invention.

[0029] If it is a transparent and colorless plate as a substrate used for this invention, there will be especially no limit, for example, plates, such as glass, polyester, a polycarbonate, polyacrylate,

and polyether sulphone, will be raised. The thickness has about 0.5–1.5 goodmm.

[0030] The bridge formation object of an anionic color tingibility polymer used for this invention stiffens the anionic color tingibility photopolymer which uses an anionic color tingibility polymer and a photosensitive compound as an indispensable component. An anionic color tingibility polymer uses hydrophilic monomers other than an anionic color tingibility monomer and an anionic color tingibility monomer (only henceforth "a hydrophilic monomer") as an indispensable component. This anionic color tingibility polymer can be created by using a well-known solution polymerization method conventionally.

[0031] An anionic color tingibility monomer is a monomer which has for example, the 3rd class nitrogen or the 4th class nitrogen in the molecule, and has the property which gives the tinctorial power of an anionic color to the polymer here. Specifically For example, (N and N–dimethylamino), ethyl acrylate, Ethyl methacrylate, ethyl acrylate (N and N–diethylamino), (N and N–dimethylamino) Ethyl methacrylate, 3–(N and N–dimethylamino) propylacrylate, (N and N–diethylamino) Alkyl (C(N and N–JI (C1 – C4) alkylamino) 1 – C4) (meta) acrylate, such as 3–(N and N–dimethylamino) propyl methacrylate, Alkyl (C(N and N–JI (C1 – C4) alkylamino) 1 – C4) (meta) acrylamides, such as 3–(N and N–dimethylamino) propyl acrylamide and 3–(N and N–dimethylamino) propyl methacrylamide, (Although N and N–diethylamino ethyl vinyl ether, 4–vinylpyridine, diarylamine, 2–hydroxy–3–methacryloyl oxypropyl trimethyl ammonium chloride, and methacryloiloxy–ethyl trimethylammonium chloride are mentioned) If the monomer of points (meta), such as stability, to an acrylamide system is desirable and takes into consideration especially the dyeing property of an anionic color The monomer of the acrylamide system which has the 3rd class nitrogen, such as the monomer which has the 3rd class nitrogen in the molecule, for example, 3–(N and N–dimethylamino) propyl acrylamide, and 3–(N and N–dimethylamino) propyl methacrylamide, in the molecule (meta) is the most desirable. These anionic color tingibility monomers are independent, or they are used by two or more sorts, mixing.

[0032] Moreover, as a hydrophilic monomer, acrylamide (meta), vinyl pyrrolidone, etc. with which two alkyl groups (C1 – C4) may combine one **, such as hydroxy (C1 – C4) alkyl (meta) acrylate, such as hydroxyethyl acrylate and hydroxyethyl methacrylate, acrylamide, methacrylamide, dimethylamino acrylamide, and methylamino acrylamide, are mentioned, for example. These hydrophilic monomers are independent, or they are used by two or more sorts, mixing.

[0033] The blending ratio of coal of these anionic color tingibility monomers and hydrophilic monomers has [25 – 85 % of the weight of anionic color tingibility monomers / 15 – 75 % of the weight of hydrophilic monomers] 20 – 70 % of the weight preferably desirable 30 to 80% of the weight preferably.

[0034] As a photosensitive compound, for example A diazido chalcone, 4, the 4'–diazido stilbene –2, a 2'–disulfon acid, 4, the 4'–diazido stilbene –2, 2'–disulfon acid sodium, 4, the 4'–diazido stilbene –2, a 2'–disulfon acid (screw (methoxy ethyl)) amide, 4 and 4'–diazido stilbene – 2 and 2 — '4, such as – disulfon acid (screw (ethoxyethyl)) amide, 4' – diazido stilbene –2 and 2' — azide compounds, such as – disulfon acid (mono–** is screw (C1 – C4) (alkoxy (C1 – C4) alkyl)) amide, — The acrylic compound which has two or more well-known functional groups conventionally is mentioned. These photosensitive compounds are independent, and ** is used by two or more sorts, mixing. When using an azide compound as a photosensitive compound, it is desirable to use about 2 to 15% of the weight to an anionic color tingibility polymer, and it is desirable to use about 3 to 8% of the weight especially.

[0035] in addition, the compound which has acryloyl (meta) radicals other than the above-mentioned anionic color tingibility monomer and a hydrophilic monomer — the anionic color tingibility polymer 100 weight section — receiving — 0.1 – 10 weight section — a cure rate goes up and is desirable when 0.5–6 weight section extent addition is carried out especially. (Meta) As a compound which has an acryloyl radical For example, 3, 9-screw (2-acryloyloxy –1, 1-dimethyl) 2, 4, and 8, and spiroglycol diacrylate [10-tetraoxaspiro [5, 5] undecane] cyclohexane dimethylol diacrylate, Ethylene glycol diacrylate, diethylene glycol diacrylate, Triethylene glycol diacrylate, polyethylene-glycol diacrylate, Polypropylene-glycol diacrylate, butylene-glycol diacrylate, Neopentyl glycol diacrylate, 1,4–butanediol diacrylate, 1,6–hexanediol diacrylate, pentaerythritol

diacrylate, A pentaerythritol thoria chestnut rate, trimethylolpropane triacrylate, Novolak system epoxy acrylate, bisphenol A system epoxy acrylate, Alkylene glycol diepoxy acrylate, glycidyl ester acrylate, Polyester system diacrylate, bisphenol A system diacrylate, Urethane system diacrylate, methylenebis acrylamide, ethylene glycol dimethacrylate, Diethylene-glycol dimethacrylate, triethylene glycol dimethacrylate, Polyethylene glycol dimethacrylate, propylene glycol dimethacrylate, Petit RENGU recall dimethacrylate, neopentyl glycol dimethacrylate, 1,4-butenediol dimethacrylate, 1, 6-hexanedioldimethacrylate, trimethylolpropanetrimethacrylate, etc. are mentioned.

[0036] When using the acrylic compound which has two or more well-known functional groups conventionally as a photosensitive compound, it is desirable to use about 10 to 40% of the weight to an anion color tingibility polymer, and it is desirable to use about 15 to 35% of the weight especially. In this case, a photosensitizer may be used together.

[0037] When the reinforcement of the photo-curing object of the anionic color tingibility polymer which consists of a copolymerization object of an anionic color tingibility monomer and a hydrophilic monomer is inadequate, the reinforcement can be raised if a hydrophobic monomer is used together as a monomer which constitutes this polymer. As a hydrophobic monomer, the alkyl ester of acrylic acids (meta), such as methyl acrylate, methyl methacrylate, ethyl acrylate, butyl acrylate, butyl methacrylate, 2-ethylhexyl acrylate, and 2-ethylhexyl methacrylate, styrene, p-methyl styrene, etc. are mentioned, for example. It is [20 – 70 % of the weight of anionic color tingibility monomers / 10 – 60 % of the weight of hydrophilic monomers / 10 – 50 % of the weight of hydrophobic monomers] preferably desirable [the blending ratio of coal of an anionic color tingibility monomer, a hydrophilic monomer, and a hydrophobic monomer / 20 to 50% of the weight] 25 to 60% of the weight preferably that it is 20 – 40 % of the weight preferably.

moreover, the molecular weight of the anionic color tingibility polymer created by doing in this way — desirable — 5,000–200,000 — 10,000 to about 100,000 are still more preferably good.

[0038] The anionic color tingibility photopolymer constituent which consists of the above presentation is used usually diluting it with an organic solvent etc. Although methyl cellosolve, ethyl ROSESORUBU, TOSOPURO pill cellosolve, ethylene glycol monoethyl ether acetate, diethylene-glycol wood ether, diethylene-glycol diethylether, a methyl ethyl ketone, a methoxy isopropyl glycol, etc. are mentioned as an organic solvent, the isopropyl cellosolves from a point and diethylene-glycol wood ether, such as spreading nature, are desirable. These are independent, or they are used by two or more sorts, mixing. Although it cannot generally specify since the rate of the organic solvent occupied in this photopolymer liquid changes with presentations occupied in these resin liquid, it is desirable to make resin liquid become the viscosity which can be applied to a substrate front face. In addition, since when using an azide compound as a photosensitive compound avoids the decomposition and side reaction, the moisture content in photopolymer liquid is desirable for 1 or less % of the weight.

[0039] As an example of a photopolymer constituent, the photopolymer constituent currently indicated by JP,62-194203,A is desirable. As photopolymer liquid, CFR633DHP, CFR633L1 (all are the Nippon Kayaku Co., Ltd. make), etc. are mentioned, for example. An anionic color tingibility polymer has desirable resin which has the 3rd class amino group in respect of dyeing property, thermal resistance, etc.

[Translation done.]

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EXAMPLE

[Example] Hereafter, the example of reference and an example explain this invention still more concretely.

Example of reference Preparation of anionic color tingibility photopolymer liquid 3-(N and N-dimethylamino) propyl acrylamide The 38 sections 2-hydroxyethyl methacrylate The 15 sections Dimethylamino acrylamide The ten sections Vinyl pyrrolidone The seven sections Methyl methacrylate The eight sections Methyl acrylate The polymerization of the monomer of the 22 section above-mentioned formula is carried out by the well-known solution polymerization method, and it dries until it becomes less than [ejection moisture content 1 w/w%] about this polymer (average molecular weight 90,000) after supplying in a lot of isopropyl ether and making the amount of polymer precipitate. This desiccation polymer 100 section is made to carry out the mixed dissolution of 4, the 4'-diazido chalcone 2 section, 4, the 4'-diazido stilbene -2, the 2'-disulfon acid (screw (ethoxyethyl)) amide 6 section, the silane coupler KBM603(Shin-Etsu Chemical Co., Ltd.) 2 section, the isopropyl cellosolve 450 section, and the diethylene-glycol wood ether 450 section, and photopolymer liquid of 1 or less % of the weight of moisture contents is obtained.

[0041] The CFR633DHP(Nippon Kayaku Co., Ltd. make)100 section and the silane coupling agent KBM603 (Shin-Etsu Chemical Co., Ltd. make) 0.05 section which dissolved in the solvent the anionic color tingibility polymer and azide compound which are obtained by copolymerizing an example 1 anionic color tingibility monomer, a hydrophilic monomer, and a hydrophobic monomer and which are anionic color tingibility photopolymer liquid are mixed. The coat of this is carried out on a glass substrate with a spin coat method, and it lets a band-conveyor type UV irradiation machine pass after desiccation for 3 minutes at 110 degrees C, and is light exposure 150 mJ/cm². It exposes completely and is made to harden. In this way, it positions precisely by the optical place method, and the glass substrate which has the formed dyed thin film (bridge formation body whorl of an anion color tingibility polymer) is set to an ink jet printer.

[0042] Subsequently, blue coloring matter compound No.1 The five sections, N-methyl pyrrolidone The heating dissolution of the mixture which consists of the 20 sections and the water 75 section is carried out, and blue ink is prepared through a 0.2-micrometer membrane filter. Independently, it is green coloring matter compound No.2. The five sections, N-methyl pyrrolidone The 20 sections, water The heating dissolution of the mixture which consists of the 75 sections is carried out, and green ink is prepared through a 0.2-micrometer membrane filter. Furthermore, the red-dyes compound No.35 section, N-methyl pyrrolidone The 20 sections, water The heating dissolution of the mixture which consists of the 75 sections is carried out, and red ink is prepared through a 0.2-micrometer membrane filter.

[0043] The above-mentioned blue ink is injected by the ink jet, and it is made to adhere to the part which should be colored the blue of this dyed thin film. Next, the above-mentioned green ink is injected to this dyeing thin film by the ink jet, and it is made to adhere to the part which should be colored the green of this dyeing thin film. The above-mentioned red ink is injected to this dyeing thin film by the ink jet, and it is made to adhere to the part which should be colored the red of this dyeing thin film finally. Stoving of this is carried out for 10 minutes on the hot plate heated at 150 degrees C. Next, after carrying out shower processing of the printed glass

substrate for 5 minutes with the warm water of 70-degree-CpH7, it dried for 10 minutes at 130 degrees C, and the light filter of R-G-B 3 color was obtained. In this way, the light filter of R-G-B 3 obtained color is about 150-micrometer almost circular pattern respectively, and has the engine performance equivalent to the light filter formed by the so-called conventional staining technique.

[0044] The CFR633L1 (Nippon Kayaku Co., Ltd. make) 100 section and the silane coupling agent KBM603 (Shin-Etsu Chemical Co., Ltd. make) 0.05 section which dissolved in the solvent the compound which has acryloyl (meta) radicals other than the anionic color tingibility polymer, azide compound and anionic color tingibility monomer which are made to carry out copolymerization of an example 2 anionic color tingibility monomer, a hydrophilic monomer, and the hydrophobic monomer, and are obtained, and a hydrophilic monomer and which are anionic color tingibility photopolymer liquid are mixed. The coat of this is carried out on the glass substrate which has a black stripe made from a pigment-content powder resist with a spin coat method, and it exposes completely and is made to harden from an after [desiccation] glass side for 3 minutes at 110 degrees C. Then, it is immersed in a tetramethyl hydroxide water solution 2%, negatives are developed, it dries for 20 minutes at 150 degrees C after rinsing, and the high dye affinity resin film (bridge formation body whorl of an anionic color tingibility polymer) which has a black stripe on a substrate is obtained. It positions precisely and this glass substrate is set to an ink jet printer.

[0045] Subsequently, yellow coloring matter compound No.4 The two sections, N-methyl pyrrolidone The heating dissolution of the mixture which consists of the ten sections and the water 88 section is carried out, and yellow ink is prepared through a 0.2-micrometer membrane filter. Independently, it is Magenta coloring matter compound No.5. The two sections, N-methyl pyrrolidone The ten sections, water The heating dissolution of the mixture which consists of the 88 sections is carried out, and Magenta color ink is prepared through a 0.2-micrometer membrane filter. Furthermore, cyanogen coloring matter compound No.6 The two sections, N-methyl pyrrolidone The ten sections, water The heating dissolution of the mixture which consists of the 88 sections is carried out, and cyanogen color ink is prepared through a 0.2-micrometer membrane filter.

[0046] The above-mentioned yellow ink is injected by the ink jet, and it is made to adhere to the part which should be colored the yellow of this dyed thin film. Next, the above-mentioned Magenta color ink is injected to this dyeing thin film by the ink jet, and it is made to adhere to the part which should be colored the Magenta color of this dyeing thin film. The above-mentioned cyanogen color ink is injected to this dyeing thin film by the ink jet, and it is made to adhere to the part which should be colored the cyanogen color of this dyeing thin film finally. The 70-degree C warm water (pH 3 [about]) which contains stoving and 0.2% of acetic acids like an example 1 after this performed shower processing, and the light filter of Y-M-C 3 color was obtained.

[0047] The example 3CFR633L1 (Nippon Kayaku Co., Ltd. make) 100 section and the silane coupling agent KBM603 (Shin-Etsu Chemical Co., Ltd. make) 0.05 section are mixed. Revolution spreading of this is carried out so that it may become 1.5-micrometer thickness with a spinner on a glass substrate, and negatives are exposed and developed using the mask after desiccation for 20 minutes at 90 degrees C, and a stripe pattern with a line breadth [of 20 micrometers] and a line spacing of 120 micrometers is formed. In this way, the substrate which has the obtained stripe pattern is positioned to accuracy, and it sets to an ink jet printer. Subsequently, pigmentum-nigrum compound No.7 The six sections, N-methyl pyrrolidone The 20 sections, water The heating dissolution of the mixture which consists of the 74 sections is carried out, and black ink is prepared through a 0.2-micrometer membrane filter.

[0048] The above-mentioned black ink is injected by the ink jet, and a stripe pattern is dyed black. It is immersed into the solution which dries this for 10 minutes at 150 degrees C, and, subsequently to 1L. of water, contains tannin 3g, 1g of tartar emetics, and 3g of acetic acids, and fixing processing is performed and it dries. Then, CFR 633L1 is applied on the substrate which has this black stripe, the same actuation as an example 2 is performed, and a light filter is obtained.

[Translation done.]